IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:

Applicant(s): Alexander Berger, *et al*.   Examiner: Chelcie L. Daye

Serial No: 10/774,885   Art Unit: 2161

Filing Date: February 9, 2004

Title: OPTIMIZED DISTINCT COUNT QUERY SYSTEM AND METHOD

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY BRIEF

Dear Sir:

Applicants' representative submits this Reply Brief in response to the Examiner's Answer dated August 3, 2007. In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [MSFTP606US].

REMARKS

Claims 1-25 and 27-31 are currently pending and are presently under consideration. Favorable reconsideration of the subject patent application is respectfully requested in view of the comments herein. In particular, the following comments address deficiencies contended in the Examiner's Answer to applicants' Appeal Brief.

I.   Regarding the Rejection of Claims 1-25 and 27-31 Under 35 U.S.C. §103(a)

The Examiner incorrectly maintains the rejection of claims 1-25 and 27-31 under 35 U.S.C. §103(a) as being unpatentable over Mittal *et al.* (U.S. 2005/0138001) in view of Agrawal *et al.* (U.S. 5,926,820) and further in view of Ballamkonda *et al.* (U.S. 6,775,682). Reversal of this rejection is requested for at least the following reasons. Mittal *et al.*, Agrawal *et al.*, and Ballamkonda *et al.* either alone or in combination, fail to disclose or suggest all features of the subject claims.

> To reject claims in an application under §103, an examiner must establish a *prima facie* case of obviousness. A *prima facie* case of obviousness is established by a showing of three basic criteria. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second there must be a reasonable expectation of success. Finally, *the prior art reference (or references when combined) must teach or suggest all the claim limitations*. *See* MPEP §706.02(j). The teaching or suggestion to make the claimed combination and the reasonable expectation of success must be found in the prior art and not based on the applicants' disclosure. *See In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (emphasis added).

Applicants' claimed invention relates to the optimization of a distinct count query on large quantities of data. Data in the data store is pre-aggregated by partitioning and ordering the data. A query processor receives the pre-aggregated data, determines the maximum and minimum values of the range of each partition and uses them to identify independent partitions or partition groups. As the range of the independent partitions or partition groups do not overlap with each other, they can be processed in parallel. In particular, independent claim 1 recites *a*

***range component that determines the maximum and minimum values associated with each
partition*** *and* ***a group component that utilizes the maximum and minimum range values to
determine independent partitions or partition groups,*** *wherein independent partitions or
partition groups are executed concurrently with other partitions.* Independent claims 9, 14 and
22 recite similar features. Mittal *et al.*, Agrawal *et al.* and Ballamkonda *et al.* are silent
regarding such novel features of the claimed invention.

Mittal *et al.* relates to optimization for aggregate navigation for distinct count metrics and
calculates a distinct count metric by performing a count operation on an aggregate table.
Different aggregate tables have data aggregated over different dimensions of a column, where
the dimensions are hierarchical. Thus, the data aggregates are on partitions of the data, where
the partitions are always independent of each other. At page 11 of the Examiners Answer, the
Examiner acknowledges that Mittal *et al.* does not teach or suggest a range component that
determines the maximum and minimum values associated with each partition and provides
Agrawal *et al.* to compensate for the deficiencies of Mittal *et al.*

Agrawal *et al.* discloses a method for performing range maximum/minimum queries on
a data cube and comprises the steps of partitioning the data cube into multi level multi
dimensional blocks which are represented by a tree structure, determining the maximum or
minimum value of a range and indexing it for each block and using the index to search for a user
query. As the data cube is partitioned in multiple levels of the dimension represented by a tree
structure, the partitions are always independent of each other. Further, at the cited portions,
Agrawal *et al.* discloses reference arrays used in conjunction with a tree structure model to
improve performance of a query. When the reference array is one dimensional, the size of a
query input range, where l and h are the range lower and upper bounds, is determined and the
array is traversed starting from the lower bound l to just before the upper bound h to generate a
range max/min result. Thus, the range is determined only for the *single* lowest block in which
the query input range is determined, and thus is silent regarding a range component that
determines the maximum and minimum values *associated with each partition.* Thus, the
combination of Mittal *et al.* and Agrawal *et al.* is silent regarding ***a range component that
determines the maximum and minimum values associated with each partition.*** The Examiner
provides Ballamkonda *et al.* to cure the deficiencies of Mittal *et al.* and Agrawal *et al.*

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Ballamkonda *et al.* relates to evaluation of rollups with distinct aggregate by using sequence of sorts and partitioning by measures. Distinct aggregate functions remove duplicate records and apply the aggregate functions to the resulting records. The rollup operator aggregates data across levels specified as the keys or columns of rollup operator. At the cited portions, Ballamkonda *et al.* discloses parallel evaluation of a rollup grouping with distinct aggregates. The fact table and the associated dimensional tables are scanned, joined, sorted and elimination of duplicate records is performed on the base table specified in the query so that less data is forwarded to the next stage. Partitioning sends rows of data from one stage to the next stage and provides computational efficiency. Partitioning that occurs between stages is on grouping keys and can utilize hash or range partitioning. Hence, Ballamkonda *et al.* provides for range partitioning and parallel evaluation of these records, but is silent regarding *a range component that determines the maximum and minimum values associated with each partition* and *a group component that utilizes the maximum and minimum range values to determine independent partitions or partition groups*.

In contrast, applicants' claimed invention facilitates utilizing the maximum and minimum range values of the partitions in the data store, to determine independent partitions or partition groups, wherein independent partitions or partition groups are executed concurrently with other partitions.

In view of at least the foregoing, it is readily apparent that Mittal *et al.*, Agrawal *et al.* and Ballamkonda *et al.* fail to teach or suggest all aspects of the claimed invention. Accordingly, it is respectfully requested that the rejection of independent claims 1, 9, 14 and 22 (and the claims that depend there from) should be reversed

II.   Conclusion

The subject application is believed to be in condition for allowance in view of the above comments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [MSFTP606US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,

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